System identification for internal combustion engine model

Abstract :

A parametric and non-parametric identification of internal combustion engine (ICE) model using recursive least squares (RLS) and neuro-fuzzy modeling (ANFIS) approach are introduced in this paper. The analytical model of an internal combustion engine is excited by pseudorandom binary sequence (PRBS) input which gives random signals to make sure the information of the system covers large range of frequencies. The input and output data obtained from the simulation of the analytical model is used for the identification of the system. The simplest polynomial form, auto-regressive, external input (ARX) model structure is chosen and the performance of the system is validated by mean square error (MSE) and correlation tests. Although, both methods capable to represent the dynamic of the system very well, it is demonstrated that ANFIS gives better results than RLS in terms of mean squares error between actual and prediction